

Side Docking the Robot for Robotic Laparoscopic Radical Prostatectomy

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ABSTRACT

Background and Objectives: Low lithotomy position with the robot between the legs for docking is a standard position for robotic radical prostatectomy. Its complications include occasional nerve injury and compartment syndrome. In some patients with conditions that limit hip abduction, this position may be infeasible. We report a docking technique that obviates stirrups and simplifies setup without altering surgical technique.

Methods: A total of 100 consecutive patients underwent robotic radical prostatectomy for localized prostate cancer. Fifty patients (group 1) were in the standard lithotomy position, and the remaining 50 patients (group 2) were in slight trendelenburg position with the robot at the side of the bed – “side-docked.” Setup and docking times were recorded and both groups were compared for differences in operative variables.

Results: Mean setup time for group 2 was 4.7 minutes shorter than for group 1 ($p = 0.02$). Docking time and other operative variables were statistically similar and not affected by the adoption of side-docking technique. However, overall surgical time was longer due to modifications in other aspects of the technique during the study period.

Conclusion: Side-docking for robotic radical prostatectomy is associated with small but significant improvement in setup time and can be utilized in patients with limited hip abduction.

Key Words: Robotic radical prostatectomy; prostate cancer; robot side docking; lithotomy position.

INTRODUCTION

Robotic-assisted laparoscopic radical prostatectomy (RALP) has dramatically altered the surgical treatment of localized prostate cancer and urological surgery in general. Since the introduction of the da Vinci robot in 2001, the standard patient positioning for pelvic surgery had been the low lithotomy with the robot between the patient's legs for docking.^{1,2} This positioning can be associated with peroneal nerve injury and compartment syndromes in rare cases.³ Moreover, the low lithotomy may not be feasible in patients with a history of bilateral hip arthroplasty which typically limits abduction position. We report a docking technique that obviates the need for stirrups and attendant complications thereof, seems to simplify patient setup, and may significantly shorten surgical setup time, while not affecting overall surgical technique.

MATERIALS AND METHODS

Institutional review board approval was obtained to prospectively collect data on all patients undergoing RALP at our institution from January 2009 to April 2010, and to retrospectively review all such data collected on patients from March 2003 to January 2009. The data include patient demographics, indications for robotic prostatectomy, operating room setup start times, surgical times, console times, estimated blood loss, and perioperative complications. Setup time is defined as the time interval from patient entry to the operating room to the surgical start time, and the docking time is the time interval from port placements to docking of the robot.

Between January 2009 and April 2010, 100 consecutive patients with clinically localized prostate cancer underwent RALP at our institution. Prior to September 2009, the standard patient positioning was used for all RALP until a patient presented with prostate cancer and a history of bilateral hip arthroplasty. Positioning in the low lithotomy at surgery was not feasible due to limited lower extremity abduction secondary to prior hip surgery. In fact, maximum abduction at the knees was feasible with only 11cm of separation. Therefore posi-

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Figure 1. Side-docking da Vinci-S™ robot in radical prostatectomy.

tioning, prep, and draping were performed with the patient in the supine position. Insufflation and port placement were performed using the standard method, the robot was “side docked” to the surgical table (**Figure 1**), and the procedure proceeded uneventfully and without any appreciable effect on robot performance or overall surgical technique. Since that time, all RALP have been performed with the da Vinci-S robot side docked. There have been no apparent changes required in the surgical technique due to this new methodology.

The prospectively collected data were stratified by patient positioning, and 2 groups were consolidated consisting of 100 consecutive patients. Fifty of these patients were from the period immediately before and 50 from the period immediately after the adoption of side docking. Group 1 consisted of 50 patients who had standard low lithotomy positioning with the robot placed between the legs, and group 2 consisted of the 50 consecutive patients in the supine position with the robot side-docked. The Student *t* test was used to compare both groups.

RESULTS

Patient age and BMI for the 2 groups are depicted in **Table 1**. Both groups were statistically similar in all basic parameters, such as age, PSA, tumor characteristics, and other such things. BMI was not different ($P=0.775$). Setup time was longer for group 1 than for group 2 (**Table 2**, $P=0.022$), and the docking time was similar in both groups ($P=0.676$). Estimated blood loss was also statisti-

Table 1.
Characteristics of Study Groups

	Group 1 ^a (n=50)	Group 2 ^a (n=50)	P Value
Age (yrs)	61.2 yrs	63.0 yrs	0.203
BMI ^b (kg/m ²)	28.9 kg/m ²	29.1 kg/m ²	0.775

^aGroup 1 = Standard lithotomy position; Group 2 = Patients positioned with side-docking.

^bBMI = Body Mass Index.

Table 2.
Comparison of Operative Data of Study Groups

	Group 1	Group 2	P Value
Setup time, mins (range)	42.5 (27–83)	37.8 (22–65)	0.022
Docking time, mins (range)	5.36 (2–14)	5.46 (2–12)	0.839
Surgery time, hrs (range)	2.69 (2.0–4.1)	3.02 (2.2–4.5)	0.002
Mean EBL ^a , mL (range)	255 (50–800)	283 (50–800)	0.443
Hospital stay, days (range)	1.04 (1–2)	1.14 (1–4)	0.217

^aEBL = Estimated Blood Loss.

cally similar ($P=0.443$). Mean operative time was approximately 30 minutes longer in group 2 due to changes in other aspects of the surgical methodology, but not due to the change to side docking.

DISCUSSION

Robotic surgery has gained significant popularity with radical prostatectomy and other pelvic surgeries in the last decade. The standard patient positioning for these robotic surgeries has remained the lithotomy position with the surgical robot placed between the patient's legs for docking. This potentially precludes patients who have problems of hip abduction and also introduces potential complications of placement in stirrups, such as compartment syndromes in rare cases and neurapraxia.^{3,4}

In our series, the first patient we encountered with a limiting condition was placed in the supine position with the robot side docked (**Figure 1**). This positioning had no effect on robot performance, and the operative technique was not changed. The side docking technique seemed

remarkably simpler and was adopted immediately for all subsequent cases. Not only does this positioning change extend the benefits of robotic prostatectomy to patients with hip abduction limitations, but it also decreases the setup time for the procedure (**Table 2**) and eliminates potential complications intrinsic to stirrups.

The overall surgical time in group 2 in this series was longer because of technicalities with the port placements leading to the robotic arms' collisions. As the surgeon progressed along the learning curve in terms of knowing the distances and angles between the robotic arms needed to avoid collisions, the overall setup time was shorter. Major alterations in surgical technique were not required because of side docking, and no change in anesthesia was required. Excluding the operative times, other variables remained similar between the 2 groups. This method of docking has been successfully used on patients of different body habitus including obese patients with conditions that limit the standard lithotomy positioning.

Limitations with this study include the small number of patients and the fact that it is not a randomized study. As we utilize this method on more patients, a larger randomized study is needed to confirm or dispute our initial conclusion. Also, our conclusion cannot be generalized to other da Vinci models as we only utilized the da Vinci-S surgical system.

CONCLUSION

Side docking for robotic radical prostatectomy is a viable alternative positioning technique for patients with hip abduction limitations to the standard low lithotomy positioning. Major alterations with the surgical technique are not required, and the perioperative outcomes are comparable to outcomes with the standard low lithotomy positioning.

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